Space Weather Forecast

Issued on Monday, 08 May 2023 at 01:20 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Further R1-R2 Radio Blackouts likely. Low confidence coronal mass ejection arrivals day 1 (8th May) bring a likelihood of G1-G2 Minor/Moderate storms, with a chance of G3/Strong Storms.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Moderate with the largest flare an M1.6 at 07/2323 UTC from AR3293. This was the only M-flare through the period. There are a trio of spot groups spanning the northeast to northwest centre disc. AR3296 is the most interesting as an anti-Hale cycle region (reverse polarity) although this region has declined a little. AR3297 has simplified a little. AR3293 remains magnetically complex. The four regions in the southern hemisphere (including two unnumbered) remain small, weak and stable. Multiple CMEs were observed on the 6th May, however analysis shows no Earth directed components.

Solar Wind / Geomagnetic Activity: The solar wind has remained slightly-elevated between 400 and 500 km/s. It is possible that a CME from the 4th May arrived at Earth around 07/1500 UTC. Though the response in solar-wind parameters, and Earth magnetometers, was unremarkable. There is also a possibility that a High Speed Stream from CH01/+ was embedded in the solar-wind. Density was average until a rise to above average was observed after 07/0700 UTC. The peak values approached 40 ppcc between 07/1300 UTC and 07/1445 UTC. Density eased thereafter but remained mostly above average. Total IMF strength, Bt, was initially weak before increasing to Moderate to Strong, reaching a peak of 20nT around 07/1500 UTC. After-which the Bt eased but remained mostly Moderate. The north-south, Bz, component was mostly neutral or positive between -9 nT and +15 nT. Geomagnetic activity was Quiet to Unsettled (Kp2-3) with an isolated Active interval (Kp4) 07/1500-07/1800 UTC.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) was at background with no solar radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Further Moderate activity is likely through the next four days, mainly from the regions in the northeast to north-centre disc.

Solar Wind / Geomagnetic Activity: Of the two CMEs which left the Sun on 4th and 5th May respectively, one may have arrived around 07/1500 UTC with the second possibly still to arrive. So the risk of geomagnetic activity effects extend into day 1 (8th May). Confidence is low with their speeds, and how much material will be within them, giving a low confidence to the geomagnetic forecast. Otherwise current slightly elevated solar winds are expected to gradually ease through the period, once any CME influence has passed. If we see the second CME arrival early on day 1 this is likely to bring a spell of G1-G2 Minor to Moderate storms, with a chance of G3 Strong storms. This risk recedes later day 1 (8th May) with activity becoming mainly Quiet to Unsettled. It's possible that high speed stream influences from positive coronal hole CH02 may arrive at Earth late on day 4 (11th May) though persistence suggests impacts are likely to be weak.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is most likely to persist at background levels with no solar radiation storms occurring.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	70	10	1	5
Strong	G3	No	20	1	1	1
Severe	G4	No	2	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	60	60	60	60
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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